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We claim:

1. A light controlling film, the film having a first surface and a second surface, comprising:

a polymerized polymer network, comprising:

a crosslinked high molecular weight polymeric material; and

a low molecular weight cholesteric liquid crystal (CLC) material,

wherein the high molecular weight and the low molecular weight form a material having cholesteric liquid crystal (CLC) order, the CLC order oriented with respect to the first and the second surfaces, and

wherein light having a first polarization and a first bandwidth incident on the first surface is substantially reflected from the film, and wherein light having a second polarization and the first bandwidth incident on the first surface is not substantially reflected from the film, and wherein an electric field impressed in the film substantially changes the first bandwidth of reflection of light having the first polarization.

2. The light controlling film of claim 1, wherein the crosslinked high molecular weight polymeric material is less than 20% by weight of the film.

3. The light controlling film of claim 2, wherein the crosslinked high molecular weight polymeric material is less than 15% by weight of the film.

4. The light controlling film of claim 3, wherein the crosslinked high molecular weight polymeric material is less than 12% by weight of the film.

5. The light controlling film of claim 1, wherein the proportion of crosslinked high molecular weight material to low molecular weight material is substantially constant across the film from the first surface to the second surface.

6. The light controlling film of claim 1, further comprising a first electrically conducting material adjacent to the first surface, the first electrically conducting material for impressing an electric field in the film, the first electrically conducting material transmitting light having the first bandwidth.

7. The apparatus of claim 6, further comprising a second electrically conducting material adjacent to the second surface, wherein a voltage applied between the first and the second electrically conducting material impresses an electric field on in the film.

8. The apparatus of claim 7, wherein the second electrically conducting material transmits light having the first bandwidth.

9. The apparatus of claim 7, wherein the first polarization is a circular polarization.

10. The apparatus of claim 9, further comprising a transparent quarter wave retardation plate in close proximity to the first surface, whereby linearly polarized light incident on the transparent quarter wave retardation plate is controllably reflected.

11. The apparatus of claim 6, further comprising a means for applying an electric field in the film, the electric field varying spatially over the first surface, whereby polarized light is controllably reflected for display purposes.

12. The apparatus of claim 6, further comprising optical communication means, whereby the bandwidth of light in the optical communication means is controlled.

13. The apparatus of claim 6, further comprising means for directing light on to the first surface, and means for receiving light from the first surface, whereby polarized light with a controllable bandwidth produced in the means for receiving light.

14. The apparatus of claim 6, further comprising laser cavity means, whereby the bandwidth of the light output of the laser cavity means is controlled by the film when the film is used as a reflective element in the laser cavity.

15. The apparatus of claim 6, further comprising a transparent quarter wave retardation plate in close proximity to the first surface, whereby linearly polarized light incident on the transparent quarter wave retardation plate is controllably reflected.

16. A method of making a light controlling film, the film having a first surface and a second surface, comprising:

applying a mixture of high molecular weight polymeric material and low molecular weight polymeric material on a surface which produces a CLC order in the mixture; and

crosslinking the high molecular weight polymeric material so that the low molecular weight material does not significantly diffuse and remains uniformly distributed in the film;

wherein light having a first polarization and a first bandwidth incident on the first surface is substantially reflected from the film, and wherein light having a second polarization and the first bandwidth incident on the first surface is not substantially reflected from the film, and wherein an electric field impressed in the film substantially increases the first bandwidth of reflection of light having the first polarization.

17. The method of claim 16, wherein the step of crosslinking takes place in a time t_1 short compared to the time t_2 in which the low molecular weight material can significantly diffuse.

18. The method of claim 17, wherein the step of crosslinking takes place includes irradiation of the film by high intensity ultraviolet radiation.

19. The method of claim 18, wherein the step of crosslinking takes place includes irradiation of the film by high intensity ultraviolet radiation having a radiation intensity of greater than 0.1 watts/cm^2.

20. The method of claim 16, wherein the step of crosslinking takes place includes irradiation of the film by high energy electrons where the electron where the electron energy deposition is substantially constant throughout the film.

21. The method of claim 16, wherein the step of crosslinking takes place includes irradiation of the film by light which is substantially uniformly absorbed throughout the film.

22. The method of claim 16, wherein the step of crosslinking takes place includes heating the film substantially uniformly throughout the film.

23. A system for controlling unpolarized electromagnetic (EM) radiation comprising:

a substrate;

a single layer of material on the substrate, the material reflecting the electro-magnetic (EM) radiation, the reflected EM radiation being polarized, the reflected EM radiation having a bandwidth;

an electric field generator for generating a variable electric field in the layer of material; and

a controller for controlling the electric field generator;

whereby the controller controls the electric field generator to generate a field in the layer of material and whereby the bandwidth of the reflected EM radiation changes in response to the change of the electric field.

24. A switchable reflective polarizer for reflecting light of a first polarization, wherein the bandwidth of polarized light reflected from the reflective polarizer may be changed from a broad bandwidth to a narrower bandwidth by the application of an voltage to the reflective polarizer.

25. The switchable reflective polarizer of claim 24 in combination with an additional switchable reflective polarizer reflecting the opposite polarization, whereby the bandwidth of all light reflected from the combination may be changed from a broad bandwidth to a narrower bandwidth by the application of an voltage to the reflective polarizer.

26. The switchable reflective combination of claim 25 controllably reflecting visible light in combination with a broad band infra-red reflecting and visible transmitting component, whereby visible light may be controllably transmitted and infra-red light may be reflected.

27. The switchable reflective combination of claim 25 controllably reflecting visible light in combination with a switchable reflective combination of claim 25 controllably reflecting infra-red light, whereby visible light may be controllably transmitted and infra-red light may be controllably transmitted.